SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

2102-F-21-R-41

Name: Wall Lake **County**: Minnehaha
Legal Description: T101N-R51W-Sec. 21 & 28
Location from nearest town: 6 miles south and 1/2 mile west of Hartford, SD

Dates of present survey: June 23-25, 2008
Date last surveyed: June 26-28, 2006

Primary Game and Forage Species	Other Species
Walleye	Black Bullhead
Black Crappie	Northern Pike
Yellow Perch	White Sucker
Channel Catfish	Common Carp
	Pumpkinseed
	Bluegill
	Bigmouth Buffalo

PHYSICAL DATA

Surface Area: 207 acres
Maximum depth: 24 feet
Volume: 1,785 acre-feet
Contour map available: Yes
OHWM elevation: 1559.5
Outlet elevation: 1559.0
Watershed area: 1,118 acres
Mean depth: 11.5 feet
Shoreline length: 2.5 miles
Date mapped: 1994
Date set: April, 1983
Date set: April, 1983
Lake elevation observed during the survey: Full
Beneficial use classifications: (5) warmwater semi-permanent fish life propagation, (7) immersion recreation, (8) limited-contact recreation and (9) wildlife propagation and stock watering.

Ownership of Lake and Adjacent Lakeshore Properties:

Wall Lake is listed as meandered public water in the State of South Dakota Listing of Meandered Lakes and the South Dakota Department of Game, Fish and Parks (GFP) manages the fishery. The entire shoreline is privately owned with the exception of the Wall Lake Access Area on the southwest corner of the lake and a public swimming beach managed by Minnehaha County on the south shore.

Fishing Access:

The Wall Lake Access Area has a double lane boat ramp, dock, public toilet and excellent shore fishing access. A handicapped-accessible fishing dock was recently installed.

Field Observations of Water Quality and Aquatic Vegetation:

Although dense algae blooms reduced water clarity in some areas of the lake, the Secchi depth measurement was 61 cm (24 in) where measured. A few stands of common cattail (*Typha spp*.) were found around the shoreline in several areas.

BIOLOGICAL DATA

Methods:

Wall Lake was sampled on June 23-25, 2008 with three overnight gill net sets and ten overnight trap net sets. The trap nets are constructed with 19-mm-bar-mesh (¾ in) netting, 0.9 m high x 1.5 m wide (3 ft high x 5 ft wide) frames and 18.3 m (60 ft) long leads. The gill nets are 45.7 m long x 1.8 m deep (150 ft long x 6 ft deep) with one 7.6 m (25 ft) panel each of 13, 19, 25, 32, 38 and 51-mm-bar-mesh (½, ¾, 1, 1¼, 1½, and 2 in) monofilament netting. Sampling locations are displayed in Figure 5.

Results and Discussion:

Gill Net Catch

Black bullhead (25.6%), walleye (19.4%), black crappie (14.4%) and eight additional species were sampled in the gill nets this year (Table 1).

Table 1. Total catch from three overnight gill net sets at Wall Lake, Minnehaha County, June 23-25, 2008.

Species	Number	Percent	CPUE[1]	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Black Bullhead	41	25.6	13.7	±6.7	77.2	93	20	94
Walleye	31	19.4	10.3	±7.2	14.7	97	13	99
Black Crappie	23	14.4	7.7	±3.6	15.8	--	--	116
Channel Catfish	21	13.1	7.0	±1.3	5.8	25	5	105
Yellow Perch	13	8.1	4.3	±3.0	32.9	31	8	91
Pumpkinseed	12	7.5	4.0	±1.3	2.0	75	0	99
White Sucker	8	5.0	2.7	±2.1	2.9	--	--	--
Common Carp	4	2.5	1.3	±1.1	0.7	--	--	--
Bluegill	3	1.9	1.0	±1.3	1.2	--	--	--
O. S. Sunfish	2	1.3	0.7	±0.4	1.3	--	--	--
Northern Pike	2	1.3	0.7	±0.4	0.5	--	--	--

* 5 years (1998, 2000, 2002, 2004, 2006)

[1] See Appendix A for definitions of CPUE, PSD, RSD-P, and mean Wr.

Trap Net Catch

Black bullheads (48.5%) were also the most abundant species sampled in the trap nets (Table 2) along with eleven other species.

Table 2. Total catch from nine overnight trap net sets at Wall Lake, Minnehaha County, June 23-25, 2008.

Species	Number	Percent	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Black Bullhead	497	48.5	49.7	±21.7	308.9	97	61	91
Pumpkinseed	177	17.3	17.7	±6.2	7.6	61	0	104
Black Crappie	147	14.3	14.7	±4.6	36.4	94	1	108
Bluegill	133	13.0	13.3	±6.6	10.6	91	0	103
Yellow Bullhead	23	2.2	2.3	±0.9	0.3	100	100	115
Hybrid Sunfish	16	1.6	1.6	±1.3	0.8	--	--	--
Yellow Perch	11	1.1	1.1	±0.5	4.0	55	27	108
Bigmouth Buffalo	8	0.8	0.8	±0.5	0.9	--	--	--
Common Carp	5	0.5	0.5	±0.3	7.0	--	--	--
White Sucker	4	0.4	0.4	±0.3	0.2	--	--	--
Channel Catfish	2	0.2	0.2	±0.2	1.5	--	--	--
O. S. Sunfish	2	0.2	0.2	±0.2	0.0	--	--	--

* 5 years (1998, 2000, 2002, 2004, 2006)

Walleye

Management objective: Maintain a walleye population with a gill-net CPUE of at least 15 and a PSD range of 30-60.

Walleye gill-net CPUE declined substantially from 2006 and is now similar to CPUE recorded in 2000 and 2004 (Table 3). The population is comprised almost entirely of fish over 38 cm (15 in) long (Figure 1). No walleyes have been stocked since 2005 and the absence of small fish in this year's sample indicates that stocking is needed to maintain the population (Table 8 and Figure 1). As a result, advanced fingerling walleyes were stocked in October 2008 to supplement the population (Table 8).

Table 3. Walleye gill-net CPUE, PSD, RSD-P, and mean Wr for Wall Lake, Minnehaha County, 1999-2008.

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
CPUE		12.0		6.7		7.0		33.5		10.3
PSD		94		65		0		61		97
RSD-P		18		16		0		2		13
Mean Wr		95		94		83		93		99

Black Crappie

Management objective: Stock adult black crappies as needed to maintain a fishery.

Black crappie trap-net CPUE decreased 89% from 2006 to this year (Table 4). Although adult crappies were stocked in 2001, 2004 and 2006 (Table 8), it was evident that stocked fish comprised only a small portion of the trap net sample (Figure 2). The decline in abundance from 2006 to 2008 was likely a combination of angler exploitation and natural mortality to the stocked year class.

Table 4. Black crappie trap-net CPUE, PSD, RSD-P, and mean Wr for Wall Lake, Minnehaha County, 1999-2008.

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
CPUE		31.3		1.1		4.9		133.7		14.7
PSD		17		--		8		13		94
RSD-P		0		--		0		0		1
Mean Wr		113		--		109		125		108

Yellow Perch

Management objective: Stock adult yellow perch as needed to maintain a fishery.

Yellow perch gill-net CPUE decreased in 2008 to the lowest level in 10 years. (Table 5). Gill net CPUE was maintained at higher levels when adult perch were stocked in 1999, 2001, 2002, 2004 and 2005 and decreased dramatically when no stocking was made in 2007 (Table 5, 8). While there is evidence of some natural reproduction, it is evident stocking is needed to maintain a fishery.

Table 5. Yellow perch gill-net CPUE, PSD, RSD-P, and mean Wr for Wall Lake, Minnehaha County, 1999-2008.

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
CPUE		48.0		31.0		47.5		23.5		4.3
PSD		72		27		88		79		31
RSD-P		1		1		9		49		8
Mean Wr		103		105		101		89		91

Black Bullhead

Management objective: Maintain a black bullhead population with a trap-net CPUE of no more than100, and a PSD of at least 30.

The black bullhead population in Wall Lake is currently meeting our management objective (Table 6 and Figure 4). Bullhead abundance has remained low since 2006 (Table 6), and the lack of smaller fish in the sample suggests poor natural recruitment recently. The large bullheads will provide a quality fishery for anglers and commercial fishermen.

Table 6. Black bullhead trap-net CPUE, PSD, RSD-P, and mean Wr for Wall Lake, Minnehaha County, 1999-2008.

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
CPUE		171.9		147.8		182.2		45.4		49.7
PSD		96		83		99		99		97
RSD-P		1		9		6		27		61
Mean Wr		100		100		101		98		91

All Species

CPUE for common carp, bigmouth buffalo, channel catfish, black crappie, bluegill, and pumpkinseed was abnormally high in 2006 (Table 8). Catches were back to more average levels in 2008 following the high catches in 2006. Pumpkinseed and bluegill abundance remained above average. Wall Lake has the most diverse fish community in Region III with seventeen species represented in surveys done over the past ten years.

Table 7. Gill-net (GN) and trap-net (TN) CPUE for all fish species sampled in Wall Lake, Minnehaha County, 1999-2008.

Species	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
COC (GN)		0.3		--		--		2.5		1.3
COC (TN)		0.9		--		--		34.1		0.5
WHS (GN)		5.7		5.7		2.0		0.5		2.7
WHS (TN)		0.3		0.1		0.2		0.3		0.4
BIB (GN)		--		--		--		2.0		--
BIB (TN)		0.2		0.2		0.4		3.6		0.8
BLB (GN)		115.7		89.0		98.5		15.0		13.7
BLB (TN)		171.9		147.8		182.2		45.4		49.7
YEB (GN)		--		--		--		--		--
YEB (TN)		1.4		--		--		0.1		2.3
CCF (GN)		4.0		8.0		4.0		12.0		7.0
CCF (TN)		0.1		5.1		0.4		1.6		0.2
NOP (GN)		0.7		--		1.0		--		0.7
NOP (TN)		0.1		0.3		0.1		--		--
GSF (GN)		--		--		--		--		--
GSF (TN)		0.3		0.7		0.1		0.6		--
OSF (GN)		--		--		--		6.0		0.7
OSF (TN)		--		--		--		0.1		0.2
HYB (GN)		--		--		--		--		--
HYB (TN)		2.6		1.6		--		--		1.6
PKS (GN)		0.3		--		1.5		8.0		4.0
PKS (TN)		--		--		1.3		36.6		17.7
BLG (GN)		--		--		--		6.0		1.0
BLG (TN)		0.1		0.3		0.5		52.1		13.3
LMB (GN)		--		--		--		1.0		--
LMB (TN)		--		--		--		--		--
WHC (GN)		--		--		--		--		--
WHC (TN)		--		0.1		--		--		--
BLC (GN)		3.3		--		1.0		68.0		7.7
BLC (TN)		31.3		1.1		4.9		133.7		14.7
YEP (GN)		48.0		31.0		47.5		23.5		4.3
YEP (TN)		1.2		10.2		1.1		5.9		1.1
WAE (GN)		12.0		6.7		7.0		33.5		10.3
WAE (TN)		0.1		0.3		0.3		0.3		--

COC (Common Carp), WHS (White Sucker), BIB (Bigmouth Buffalo), BLB (Black Bullhead), YEB (Yellow Bullhead), CCF (Channel Catfish), NOP (Northern Pike), GSF (Green Sunfish), HYB (Hybrid Sunfish), PSF (Pumpkinseed Sunfish), OSF (Orange-spotted Sunfish), BLG (Bluegill), LMB (Largemouth Bass), WHC (White Crappie), BLC (Black Crappie), YEP (Yellow Perch), WAE (Walleye)

MANAGEMENT RECOMMENDATIONS

1. Continue to stock 100 walleye fingerlings per acre (20,700) every other year with the next one occurring in 2009.

2. When available, stock 10,350 adult black crappies annually to maintain a high-density, put-and-take fishery.

3. When available stock 10,350 adult yellow perch annually to maintain a high-density, put-and-take fishery.

4. Encourage commercial fishing or conduct removal projects whenever black bullhead trap-net CPUE exceeds 100 and small fish dominate the population.

5. Monitor the Wall Lake fishery with biennial netting surveys.

Table 8. Stocking record for Wall Lake, Minnehaha County, 1993-2008.

Year	Number	Species	Size
1993	956	Black Crappie	Adult
	25,000	Fathead Minnow	Adult
	22,200	Walleye	Sml. Fingerling
	2,425	Yellow Perch	Fingerling
1994	9,080	Yellow Perch	Fingerling
	1,985	Yellow Perch	Adult
1995	10,350	Channel Catfish	Fingerling
	2,071	Black Crappie	Adult
	4,329	Black Crappie	Fingerling
	238,500	Fathead Minnow	Adult
	20,700	Walleye	Sml. Fingerling
	2,085	Yellow Perch	Adult
1996	2,069	Black Crappie	Adult
	5,000	Walleye	Sml. Fingerling
	14,580	Yellow Perch	Fingerling
1997	2,220	Black Crappie	Adult
1999	20,700	Walleye	Fingerling
	2,100	Yellow Perch	Adult
	2,093	Yellow Perch	Juvenile
2000	545	Black Crappie	Adult
	24	Channel Catfish	Adult
	23	Walleye	Adult
	3,482	Yellow Perch	Adult
2001	1,659	Black Crappie	Adult
	21,120	Walleye	Fingerling
	2,245	Yellow Perch	Adult
2002	9,230	Yellow Perch	Adult
2003	22,414	Walleye	Fingerling
2004	667	Yellow Perch	Adult
	4,827	Black Crappie	Adult
	383	Walleye	Adult
2005	359	Channel Catfish	Adult
	1,034	Yellow Perch	Adult
	7,680	Walleye	Fingerling
2006	3,568	Black Crappie	Adult
	400	Channel Catfish	Adult
	26	Bluegill	Adult
2008	2,472	Walleye	Fingerling

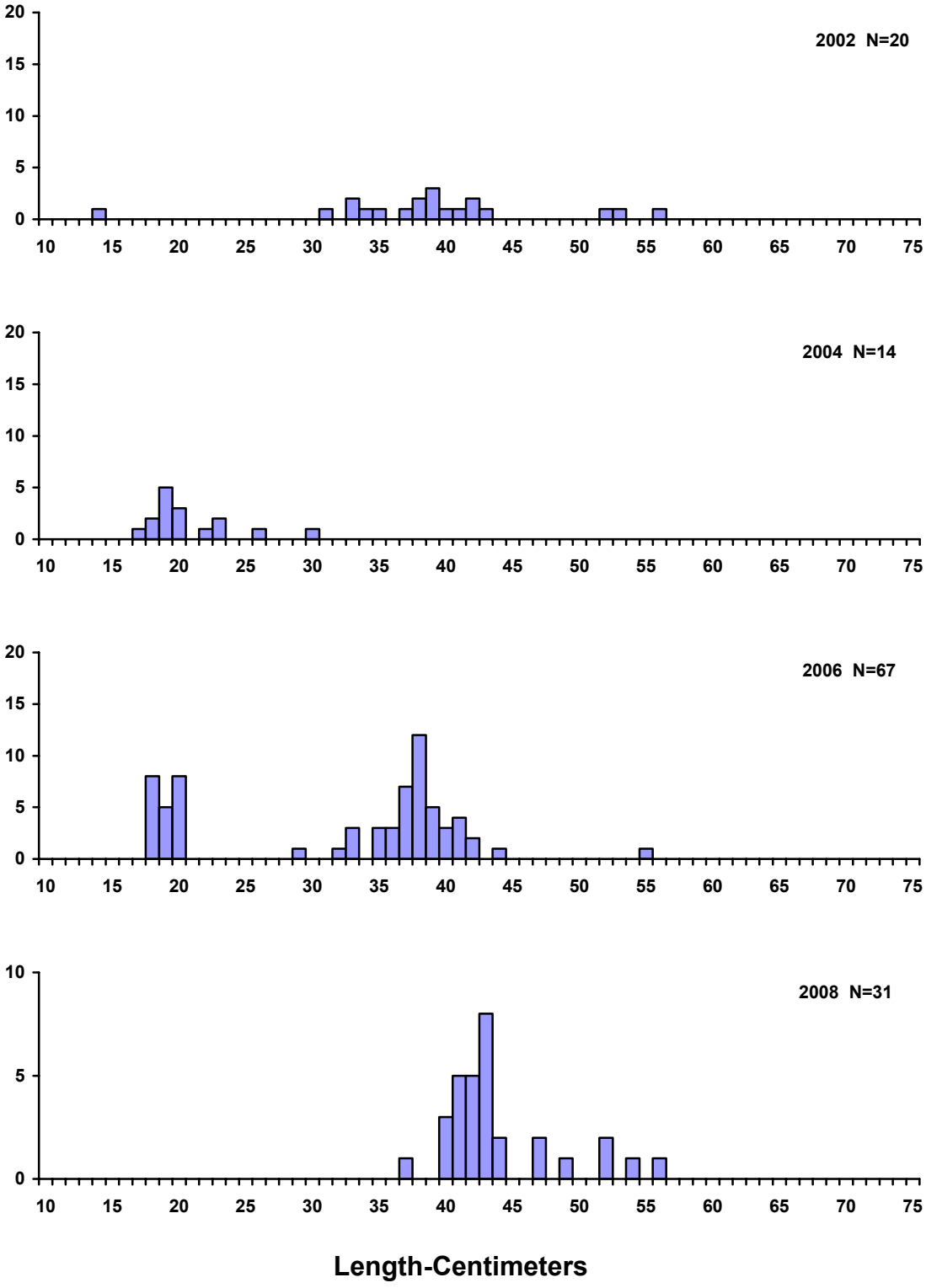


Figure 1. Length frequency histograms for walleye sampled with gill nets in Wall Lake, Minnehaha County, 2002, 2004, 2006, and 2008.

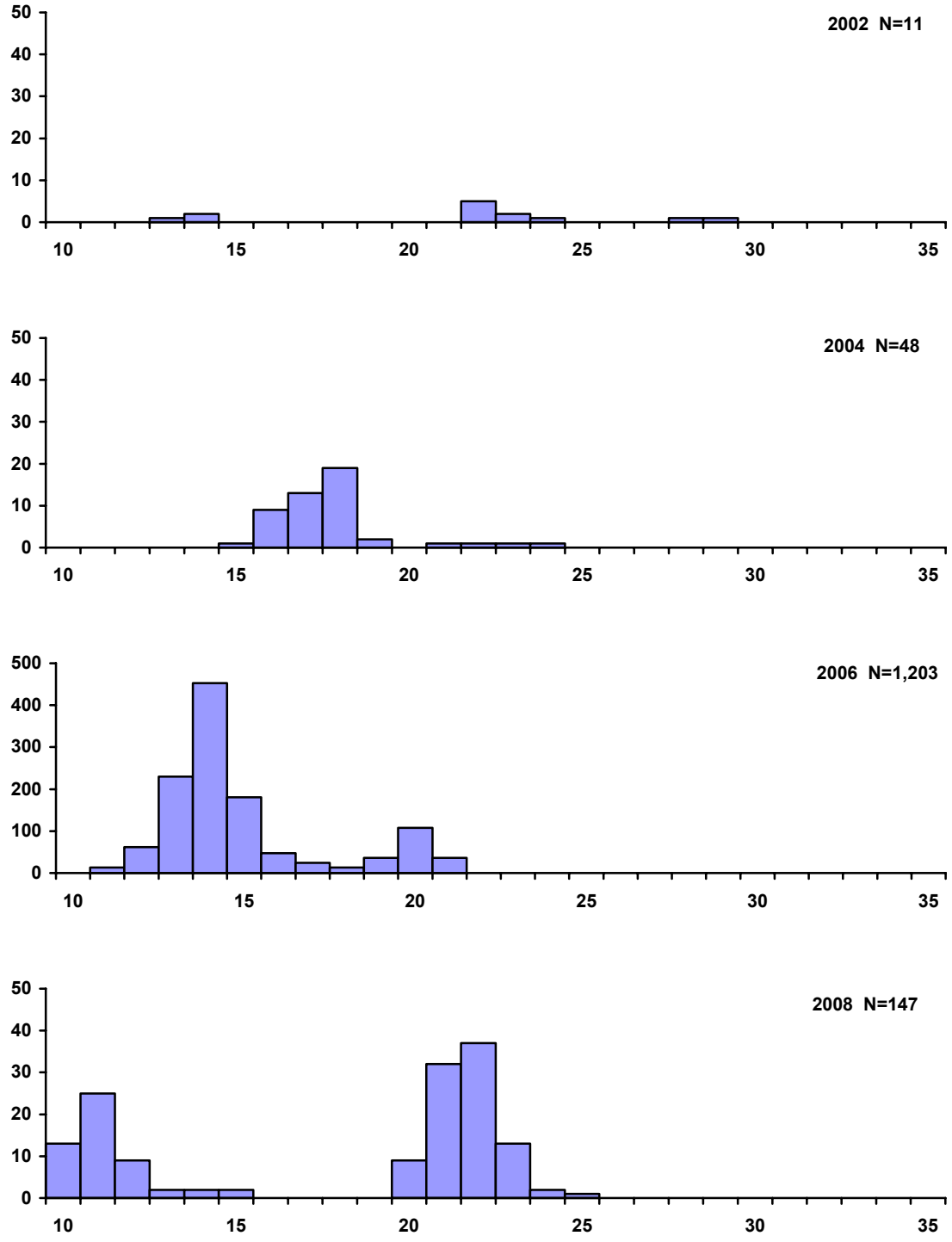


Figure 2. Length frequency histograms for black crappies sampled with trap nets in Wall Lake, Minnehaha County, 2002, 2004, 2006, and 2008.

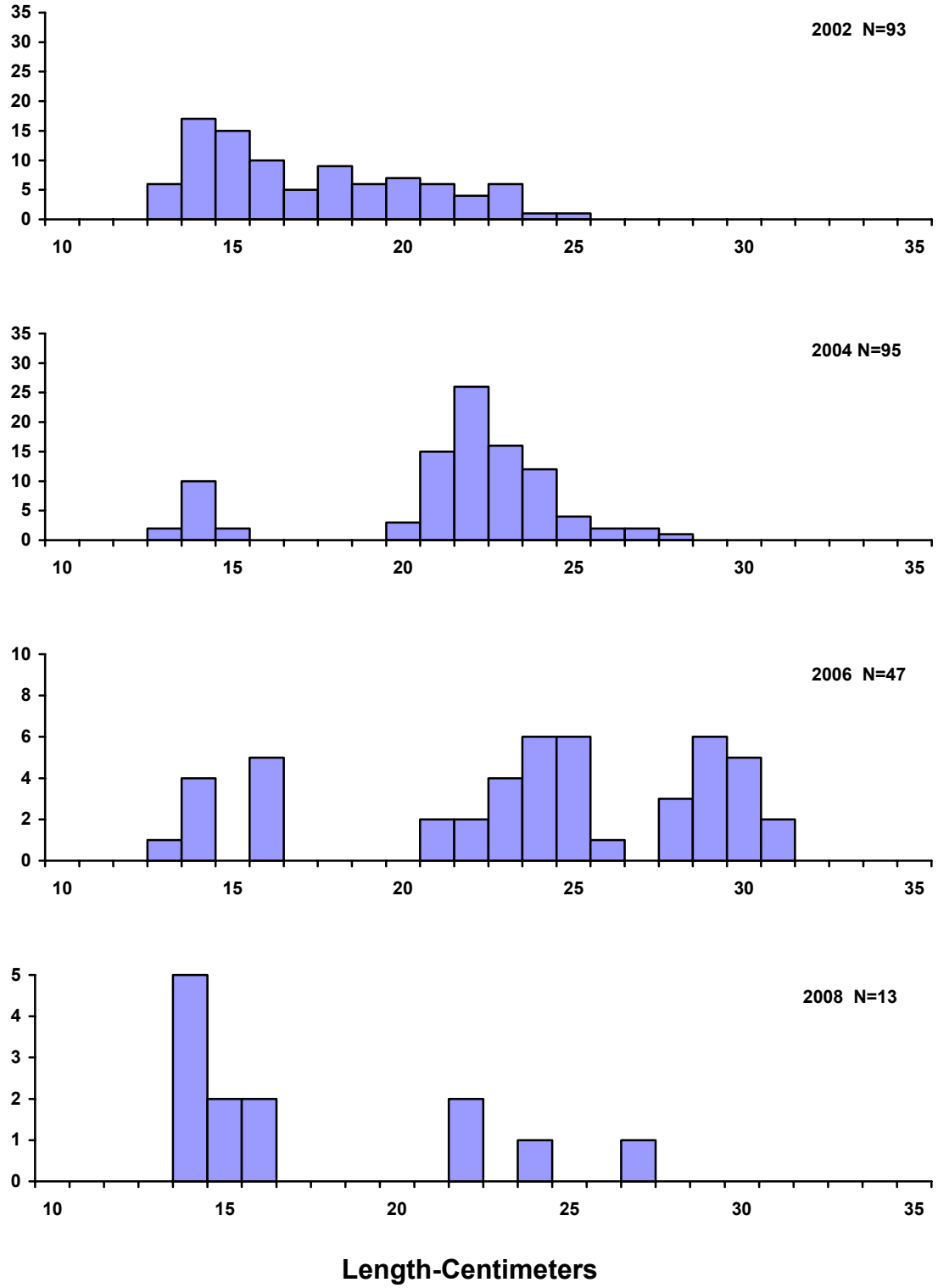


Figure 3. Length frequency histograms for yellow perch sampled with gill nets in Wall Lake, Minnehaha County, 2002, 2004, 2006, and 2008.

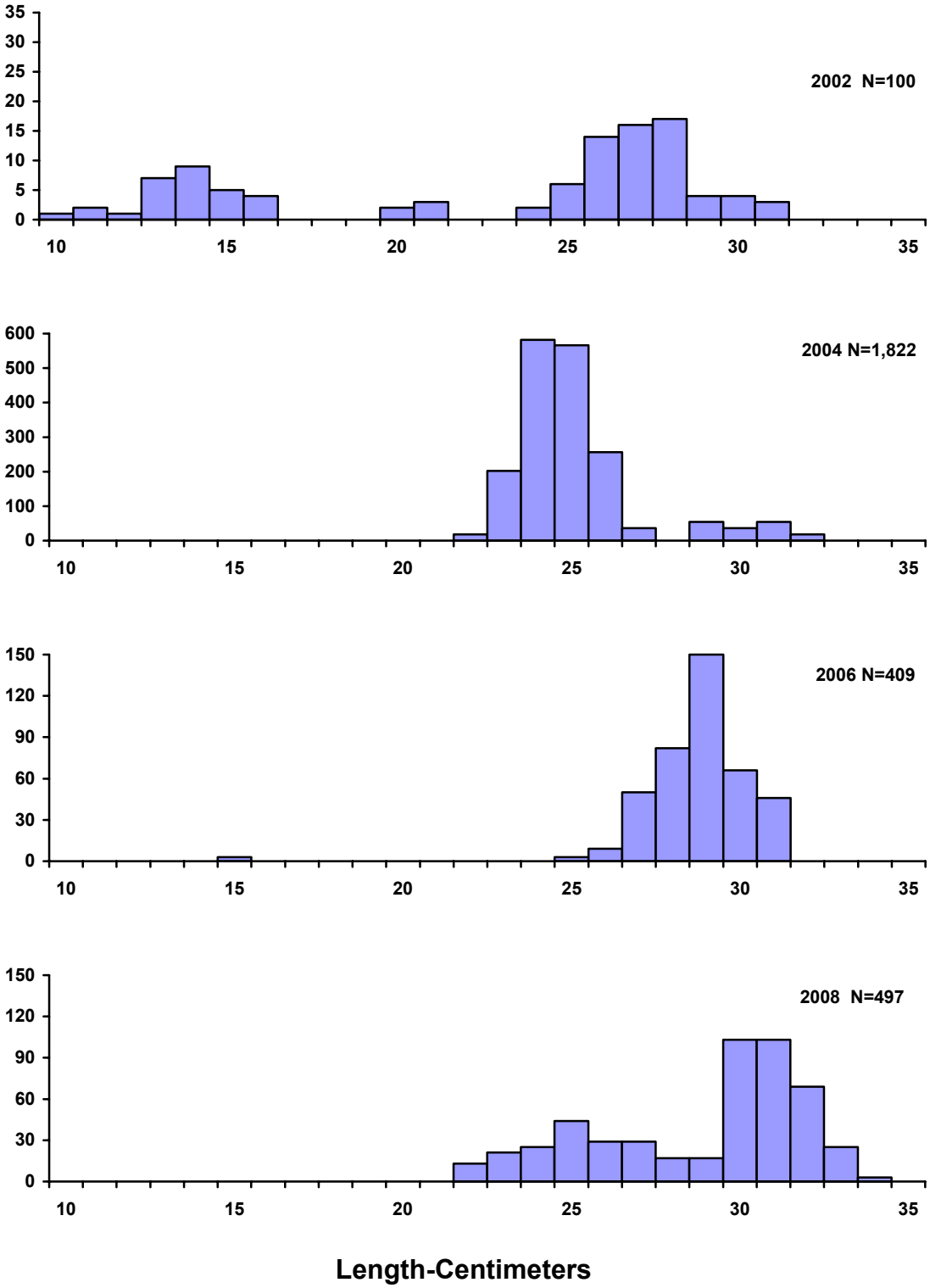
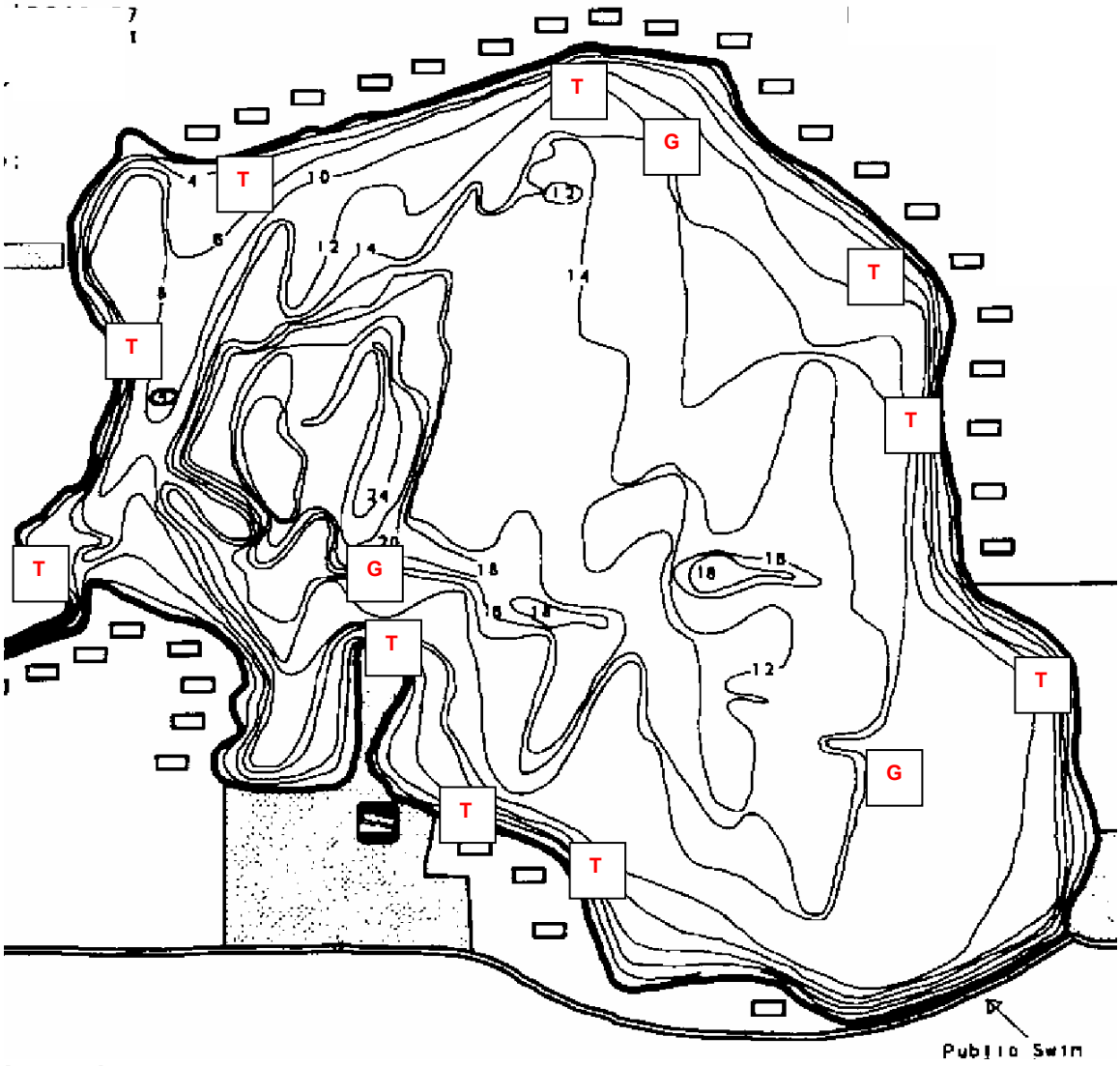


Figure 4. Length frequency histograms for black bullhead sampled with trap nets in Wall Lake, Minnehaha County, 2002, 2004, 2006, and 2008.



Legend
Gill Nets: G
Trap Nets: T

Figure 5. Sampling locations on Wall Lake, Minnehaha County, 2008.

Appendix A. A brief explanation of catch per unit effort (CPUE), proportional stock density (PSD), relative stock density (RSD) and relative weight (Wr).

Catch Per Unit Effort (CPUE) is the catch of animals in numbers or in weight taken by a defined period of effort. Can refer to trap-net nights of effort, gill-net nights of effort, catch per hour of electrofishing, etc.

Proportional Stock Density (PSD) is calculated by the following formula:

$$PSD = \frac{\text{Number of fish} > \text{quality length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

Relative Stock Density (RSD-P) is calculated by the following formula:

$$RSD\text{-}P = \frac{\text{Number of fish} > \text{preferred length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

PSD and RSD-P are unitless and usually calculated to the nearest whole digit.

Size categories for selected species found in Region 3 lake surveys, in centimeters.

Species	Stock	Quality	Preferred	Memorable	Trophy
Walleye	25	38	51	63	76
Sauger	20	30	38	51	63
Yellow perch	13	20	25	30	38
Black crappie	13	20	25	30	38
White crappie	13	20	25	30	38
Bluegill	8	15	20	25	30
Largemouth bass	20	30	38	51	63
Smallmouth bass	18	28	35	43	51
Northern pike	35	53	71	86	112
Channel catfish	28	41	61	71	91
Black bullhead	15	23	30	38	46
Common carp	28	41	53	66	84
Bigmouth buffalo	28	41	53	66	84
Smallmouth buffalo	28	41	53	66	84

For most fish, 30-60 or 40-70 are typical objective ranges for “balanced” populations. Values less than the objective range indicate a population dominated by small fish while values greater than the objective range indicate a population comprised mainly of large fish.

Relative weight (Wr) is a condition index that quantifies fish condition (i.e., how much does a fish weigh for its length). A Wr range of 90-100 is a typical objective for most fish species. When mean Wr values are well below 100 for a size group, problems may exist in food and feeding relationships. When mean Wr values are well above 100 for a size group, fish may not be making the best use of available prey.